The Importance of Dashboard in Data Analysis: An Application Example

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Introduction

Nowadays, data analysis is of critical importance for businesses, especially in reaching their strategic plans or goals. With the rapid development of the internet and technology, mobile phones and social media applications are widely used. Thus, very large amounts of data/information are produced. (Alan, 2024). Although it is difficult to analyze such large and complex data, it is very important for businesses to use this data in order to make effective and efficient decisions, rather than keeping the data idle in their memories. Today, big data analysis is no longer preferred over traditional methods. At this point, especially in a strong and challenging competitive environment, businesses should use advanced technologies that will effectively perform big data analysis processes in order to gain some advantages over other companies. Companies increase efficiency, reduce costs, and facilitate communication with customers by analyzing the big data they obtain in a short time (Uladi & Arı, 2023; Ayvaz & Salman, 2020). From this perspective, dashboards are among the developed solutions because they facilitate data analysis processes. These panels enable visualization and summary of data obtained through various means. Thus, businesses find an effective analysis opportunity in a much shorter time, increase the speed of access to information, optimize the analysis by monitoring their strategic activities, provide comprehensibility, and preserve data integrity. In addition, dashboards have a simple and informative structure and play an important role in businesses making effective decisions (Yurtay, Ayanoğlu & Yıldız, 2021). In this context, the study aimed to find answers to the extent to which the COVID-19 vaccines produced and used against the virus in the COVID-19 pandemic are related to basic headings such as supply and vaccine inequality. In this context, the data analysis process carried out in the study was supported by dashboards prepared using the Power BI program. Thus, the data will be analyzed more effectively and efficiently in a shorter time. These indicators will also make it easier for institutions, organizations, or individuals to make accurate, efficient, and effective comments and thus make some strategic decisions. In order to achieve the objectives of the study to the maximum extent, the following questions were sought to be answered:

Are states able to deliver vaccines to their citizens equally during the pandemic period?

If not, what are the reasons for this?

What are the effects of vaccine inequality?

How can vaccine inequality be resolved?

What are the parameters used to deliver the vaccine equally to every individual?

The difference and important element of this study from other studies is that it is not only prepared by conducting relevant research, but also provides institutions and organizations with the opportunity and example of implementation with indicator panels, and helps them make strategic decisions by seeing the positive and, if any, negative aspects of the application.

Literature Review

There are many studies in the literature where data is analyzed using data analysis tools such as Power BI, Tableau, etc. and dashboards are created at the end of the analysis process. For example, Picozzi et al. developed 18 key performance indicators for the Clinical Engineering Department of a hospital in Milan and aimed to optimize the maintenance and management of electromedical devices. In this process, an interactive dashboard they created using Power BI helped monitor the maintenance efficiency and obsolescence of the devices. This panel especially supported decision processes. At this point, dashboards were determined in the logistics, technical, and equipment management categories using business intelligence. This dashboard provided a comprehensive framework for continuous monitoring and decision-making processes. The results showed that the developed KPIs and dashboard have a high potential to increase operational insights and improve the maintenance processes of the healthcare facility (Picozzi, Nocco, Pezzillo, De Cosmo & Cimolin, 2024).

Gonçalves et al. evaluated the effects of business intelligence tools on decision-making processes in organizations, especially in the sales and marketing field. The study revealed that business intelligence systems allow faster and more effective analysis by implementing key performance indicators (KPIs) with data integration and transformation. As a result, it was emphasized that data-integrated dashboards play an important role in the decision-making process (Gonçalves, Gonçalves & Campante, 2023).

In their studies, Khilari et al. discussed the role and importance of business intelligence tools such as Power BI in performance management. The study discussed how these tools can improve business processes by providing more effective information to decision-makers thanks to their real-time data analysis and visualization capabilities. In addition, it was emphasized that Power BI facilitates the data analysis process with its user-friendly interface and various dashboards. As a result, it was revealed that business intelligence tools such as Power BI and Tableau play an important role in data analysis and visualization processes. It was concluded that these tools help users effectively manage their data sets and achieve business goals. It was also stated that Power BI is more suitable for small data sets and Tableau is more suitable for large data sets (Khilari, Singh & Mane, 2022).

Larasati et al. In the study, they investigated the implementation of a business intelligence dashboard (dashboard) for the BRIN Technology Services Center Public Service Institution. The study analyzed the financial data of the last five years and revealed the relationships between revenue realization and expenditures. It was emphasized how this information can support public service decision-making processes. In addition, the potential of business intelligence tools to improve performance in the public sector was also discussed. The result of the study showed that the business intelligence dashboard was an effective tool to improve the financial performance of the BRIN Technology Services Center. It was emphasized that this dashboard provided the necessary insights

for leaders to make better decisions and that improvements should be made in receivables management. It was also concluded that more care should be taken in the selection of technology service partners. Thus, it was aimed to increase the cash balance (Larasati, Tanzil, Alfian & Wardani, 2024).

Antal et al. In this study, they demonstrated the use of business intelligence software in the mining sector, improving the management of mining mechanization through data analysis and dashboards. The study aimed to provide an effective tool for monitoring performance indicators and supporting decision-making processes by analyzing failure data through the Power BI application. Using the Microsoft Power BI application, the researchers carried out the stages of collecting, processing, and visualizing data. Thus, interactive dashboards were created to monitor performance indicators and support decision-making processes. The study concluded that business intelligence software makes significant contributions to the analysis of processes and monitoring performance indicators in the mining sector. The created dashboards allow managers to focus on critical areas and make improvements thanks to the effective visualization and analysis of failure data (Antal, Marasova, Hájıček, Klapko & Mitrik, 2022).

Qi and Nagalingham emphasized the importance of Business Intelligence tools in analyzing and visualizing health data by addressing the rise of diabetes in the United States. In particular, the use of tools such as Tableau aimed to develop strategies for predicting and preventing diabetes by better-analyzing diseases and lifestyles. In addition, the effects of education and income levels on health were examined. The conclusion of the study was that business intelligence solutions allow for more effective management of diabetes through the analysis and visualization of health data. BI tools have improved the processes of monitoring and preventing diseases by providing healthcare managers with the opportunity to make more informed decisions. As a result, it has been shown that such solutions help organizations improve healthcare services and achieve better patient outcomes (Qi & Nagalingham, 2023).

Aprillia et al. In the study, they discussed the design of a dashboard to monitor the distribution of government aid in Jepara. The research aims to facilitate the visualization and analysis of data by switching from traditional reporting methods (table format) to a more user-friendly interface. The designed dashboards include various features that allow users to monitor aid distribution more effectively. The result of the study showed that the designed dashboard significantly improved the system of monitoring government aid distribution in Jepara. The dashboard presents data through graphical visualization, allowing users to understand and evaluate performance indicators more easily. As a result, this system has increased the effectiveness of aid distribution by supporting decision-making processes (Aprillia, Noranita, Kom & Tech, 2021).

Awamleh et al. In the study, they examined the impact of international performance indicators on sustainable development and the role of business intelligence techniques in this process. The research emphasizes ways to achieve sustainability goals using organizational agility and data science applications and reveals the benefits of sustainable applications in social, economic, and environmental dimensions. In addition, the importance of strategic partnerships for sustainable development is emphasized. The result of the study showed that organizational agility when combined with business intelligence systems and data science applications, has a positive impact on sustainable development. This integration supports economic, social, and environmental development by strengthening strategic decision-making processes and facilitates organizations to achieve their sustainability goals (Awamleh, Alarabiat, & Bustami, 2024).

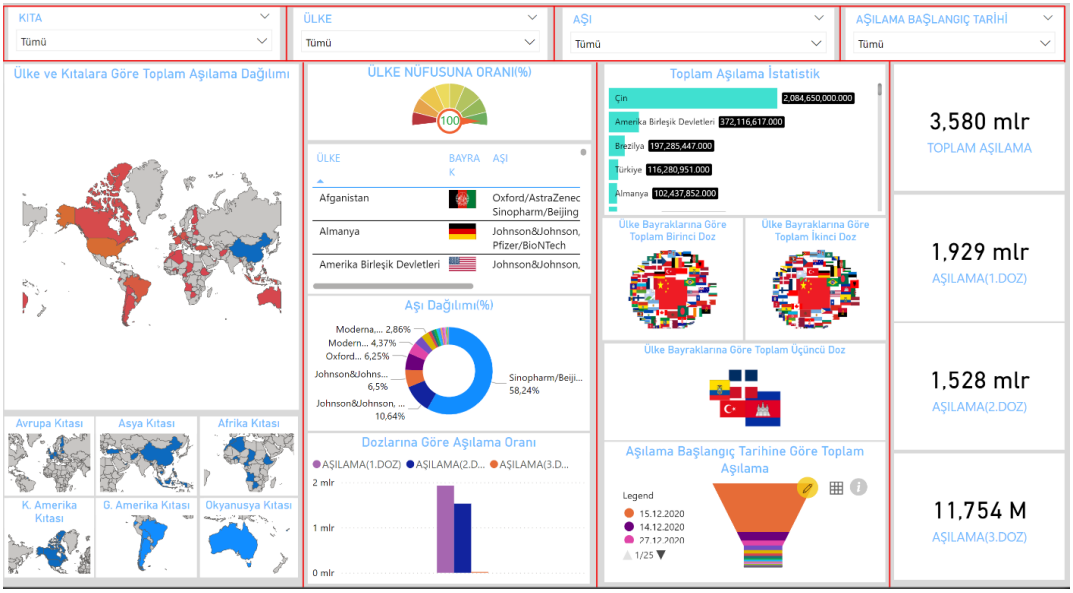
Arnaboldi et al. examined how self-service business intelligence tools, especially dashboards, used in university administration transform performance management processes. The study showed that these tools accelerate decision-making processes by facilitating users' access to data and reducing managers' dependency on data integration. In addition, dashboards emphasized the changes in organizational dynamics and the

positive feedback of users towards these tools. The results of the study showed that self-service business intelligence tools, especially dashboards, create a significant transformation in accounting and organizational processes. These tools increase users' interaction with data, causing accountants to question their traditional roles and open the door to organizational innovations. As a result, the adoption of new technologies brings with it complex dynamics such as organizational shocks and users' increasing interest in data (Arnaboldi, Robbiani, & Carlucci, 2021).

An Application Example

This section includes all the details of an application example prepared to demonstrate the importance of dashboards, which are an important step in data analysis. Power BI software was used for data analysis and dashboards. Each module is visualized one by one with dashboards and its functions are explained. The general dashboard of the application is given in Figure 1.

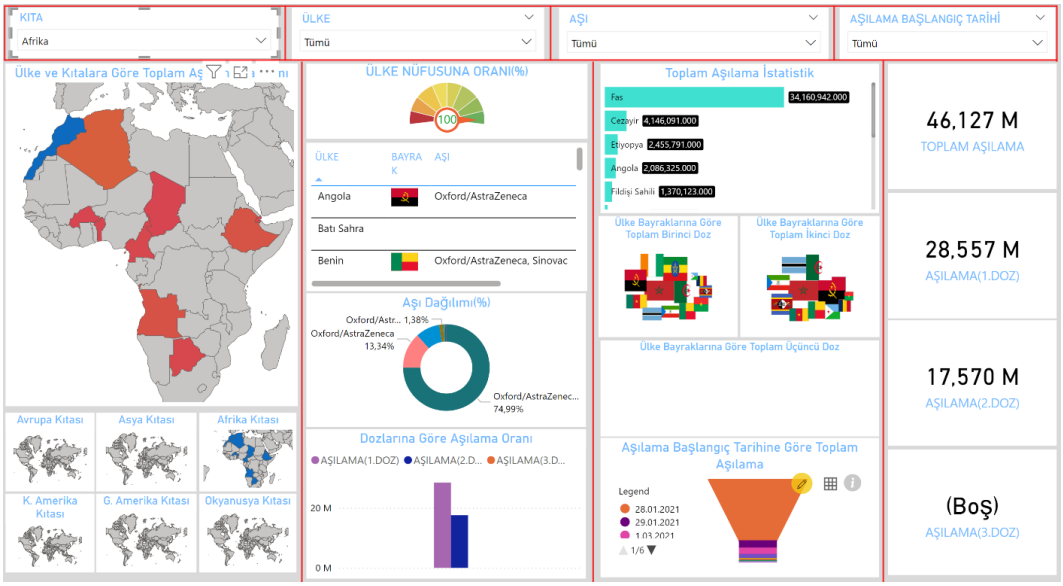
Figure 1
General view of the dashboard



Continent Module

With the continent module, information such as the total number of vaccinations in which continent, the names of the vaccines administered, the doses administered, which countries in the continent have had their first, second, and third dose vaccination studies, the location of the continent on the world map, the countries in the relevant continent, the date on which the most vaccinations were made in the continent, which country in the continent has made the most total vaccinations, etc. can be viewed by the user on the relevant dashboard.

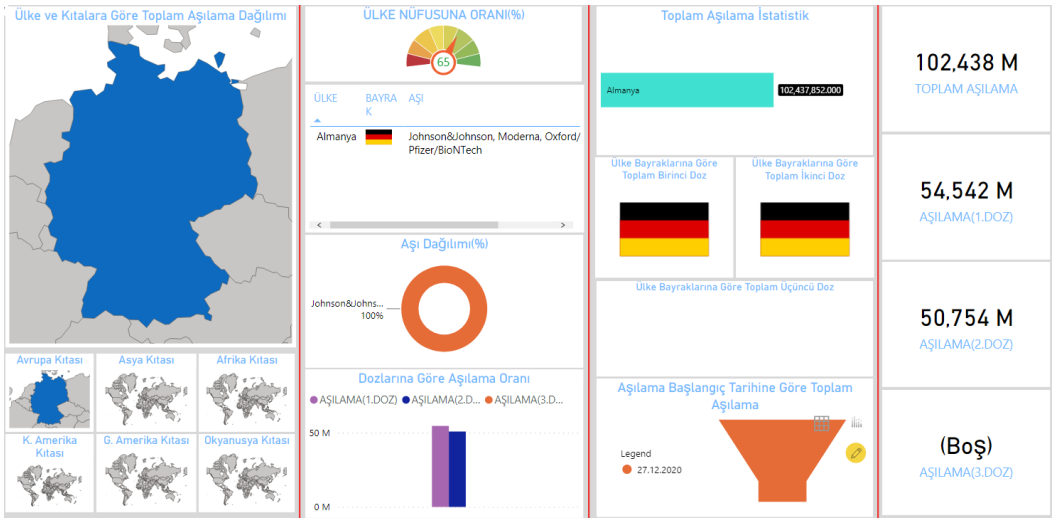
Figure 2
Relevant data visuals for the African continent



Country Module

With the country module, information such as the total number of vaccinations in each country, the names of the vaccines administered in the country, the doses administered, the first, second, and third dose vaccination studies conducted by the country, the ratio of the total vaccinations conducted by the country to the country's population, the continent in which the country is located, the country's location on the world map, and the country's vaccination start date can be viewed on the user's relevant dashboard.

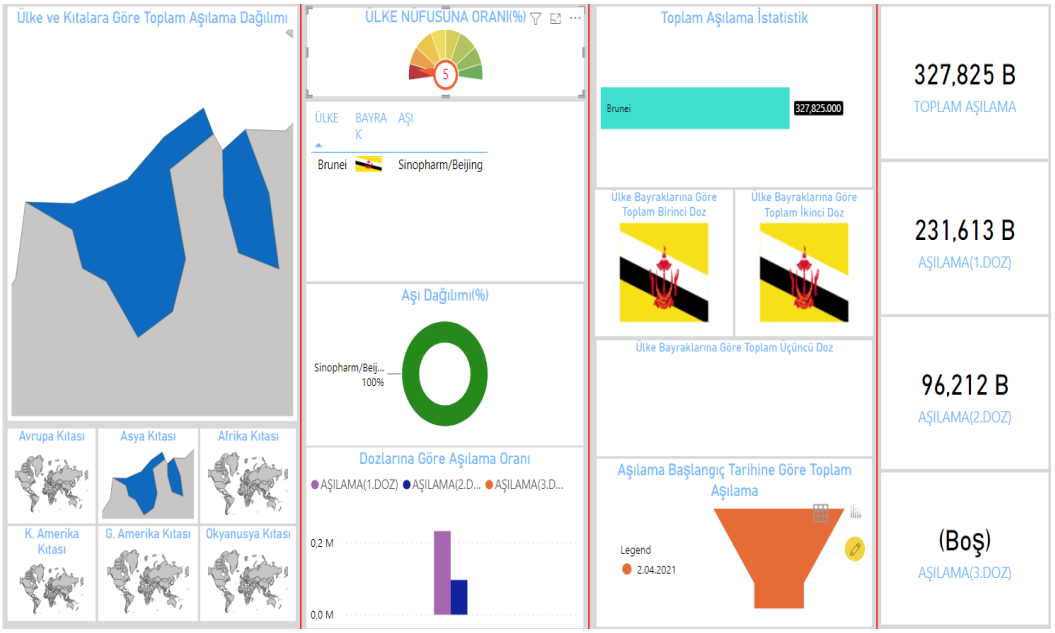
Figure 3
Relevant data visuals for the selected country



Vaccination Module

With the vaccination module, the total number of vaccinations from which vaccines, the names of the vaccines administered, the number of doses administered from which vaccines, the ratio of the vaccine administered to the country's population, which vaccine was used in which continent or continents, which vaccine was used in which country or countries, and in which country the relevant vaccine group was used the most on which date, can be seen on the dashboard by the user by selecting the relevant country.

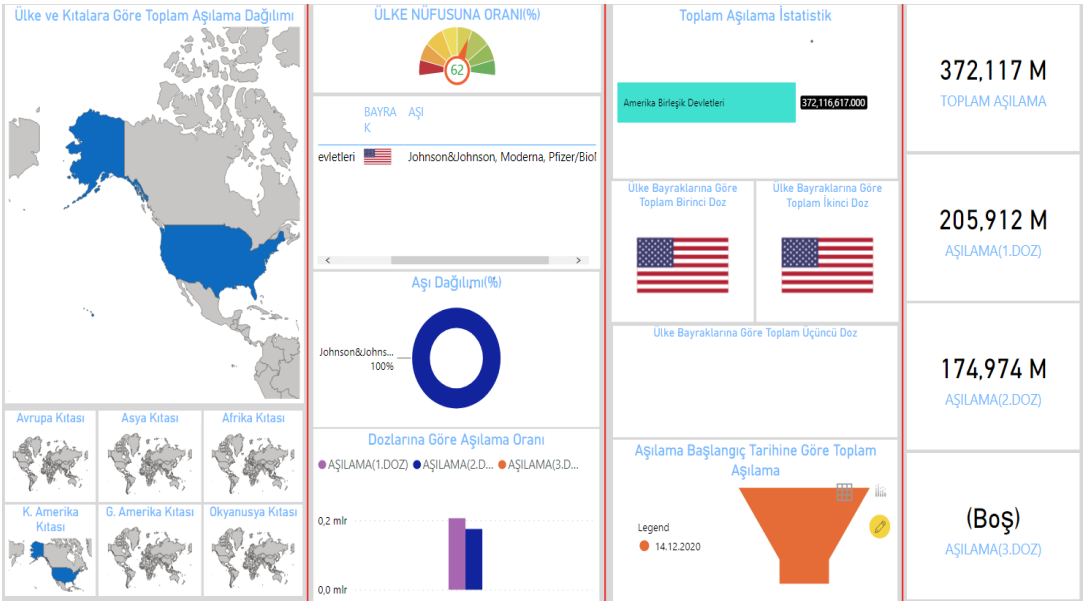
Figure 4
Relevant data visuals for the selected vaccine



Vaccination Start Date Module

With the vaccination start date module, one of the dates that vaccination started is selected and the country or countries that started vaccination on the relevant date, which continent or continents were studied on these dates, how much vaccination was done in total on the relevant date, the dose study applied on the relevant date, the ratio of the vaccine administered on the relevant date to the country's population, which vaccines were used on the selected date, can be seen on the dashboard by the user selecting the relevant date.

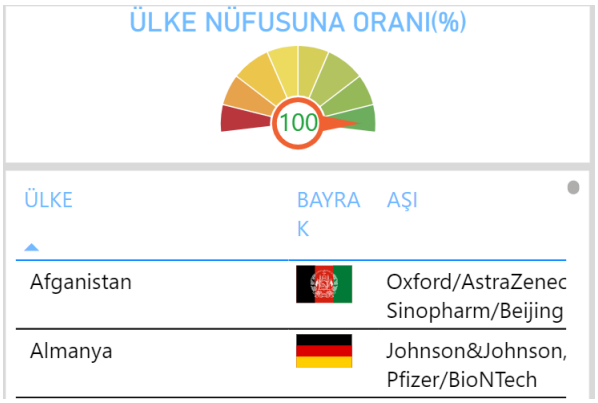
Figure 5
Relevant data visuals of the selected vaccine



Country Population Ratio Module

With this module, the vaccination status of the country selected from the country module is calculated starting from the vaccination start date and transferred to the user, and the results can be seen on the dashboard.

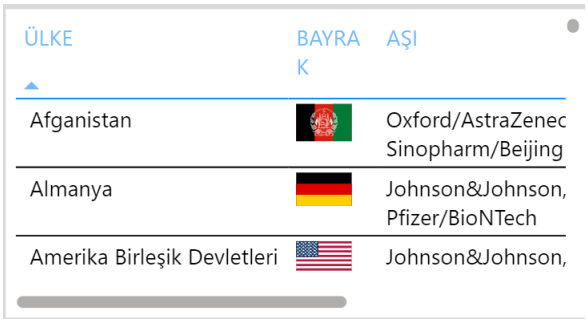
Figure 6
Indicator of how much of the country's population has been vaccinated since the vaccination start date of the selected country



Country, Flag, and Vaccine Module

With this module, the countries belonging to the continent selected from the continent module, the country selected from the country module, the country or countries using the vaccine selected from the vaccine module, the country or countries starting on the relevant date selected from the vaccination start date module, the flag image of the countries and detailed vaccines used are transferred to the user for all of these.

Figure 7
Countries belonging to the selected continent, flag, and vaccine information

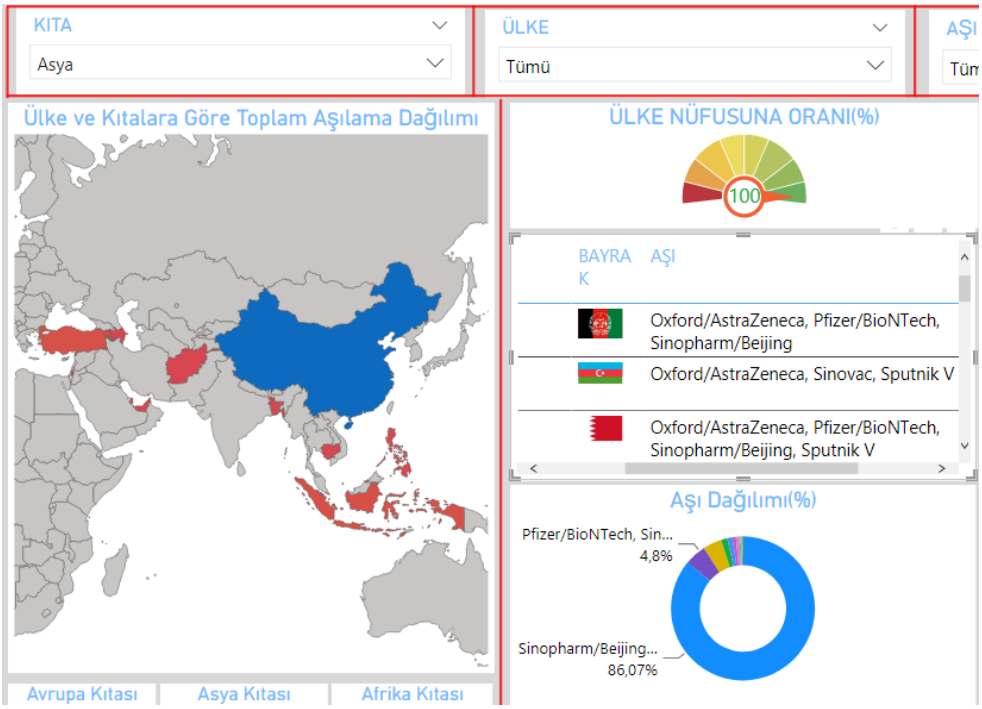


Vaccine Distribution Module

This module shows the user the rates of vaccines or vaccines used in the country, the rates of vaccines applied on the selected continent, and the rates at which vaccines are used in the world.

Figure 8

Vaccination rates for the relevant continent are shown to the user

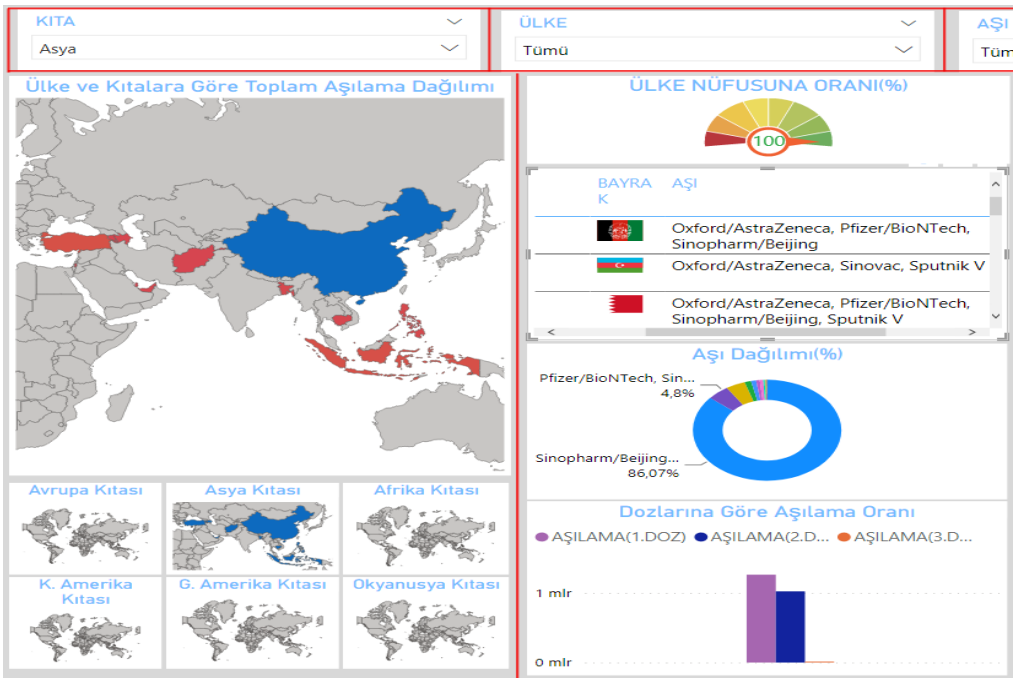


Vaccination Rate Module According to Doses

With this module, dose usage information is displayed to the user with the help of graphics for the first, second, and third doses applied within the country, on the continent, and around the world.

Figure 9

Vaccination rate according to doses for the selected country

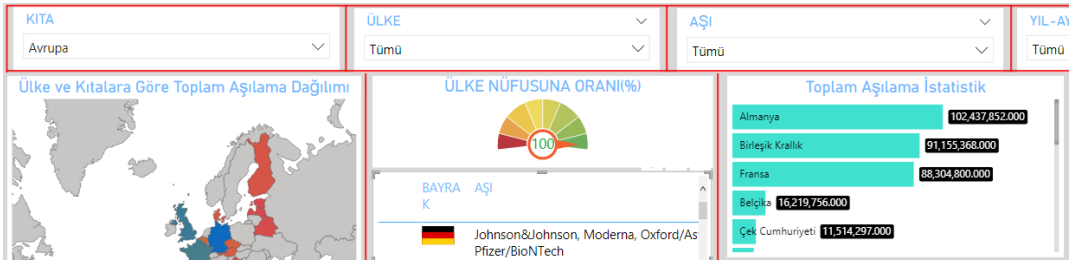


Total Vaccination Statistics Module

This module transfers the total vaccination (first, second, third dose) on the selected continent and the entire world from most to least to the user. It transfers the countries where the selected vaccine is high and in which it is low from the vaccination module to the user. By selecting the date from the vaccination start date, the order of the countries that have applied the most and least vaccinations on the relevant date is displayed.

Figure 10

Total vaccination data for the selected continent



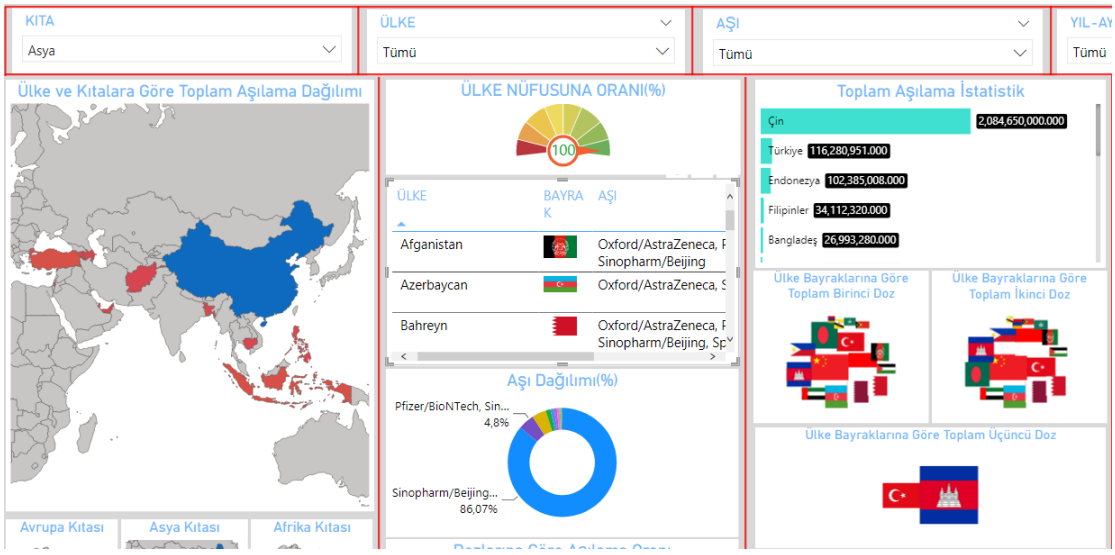
Total vaccination data of countries all over the world is transferred to the user in order from most to least. A vaccine group is selected from the vaccine module and information about which countries use more and which countries use less vaccines is transferred to the user. The date is selected from the vaccination start date and the countries with the most and least vaccinations for this date are seen.

Dose Module by Country Flag

With this module, the selection is made according to the parameters of continent, country, vaccine, and vaccination start date. The flags of the countries that applied the first, second, and third doses are included in the relevant module according to the dose applied. The flag of the country is included in the module according to the doses applied for the country. According to the relevant vaccination start date parameter, the country or countries whose vaccination start date is the selected date come, and their flags are included in the relevant module, and the applied dose information is transferred to the user.

Figure 11

Doses of the countries belonging to the selected continent according to their flags

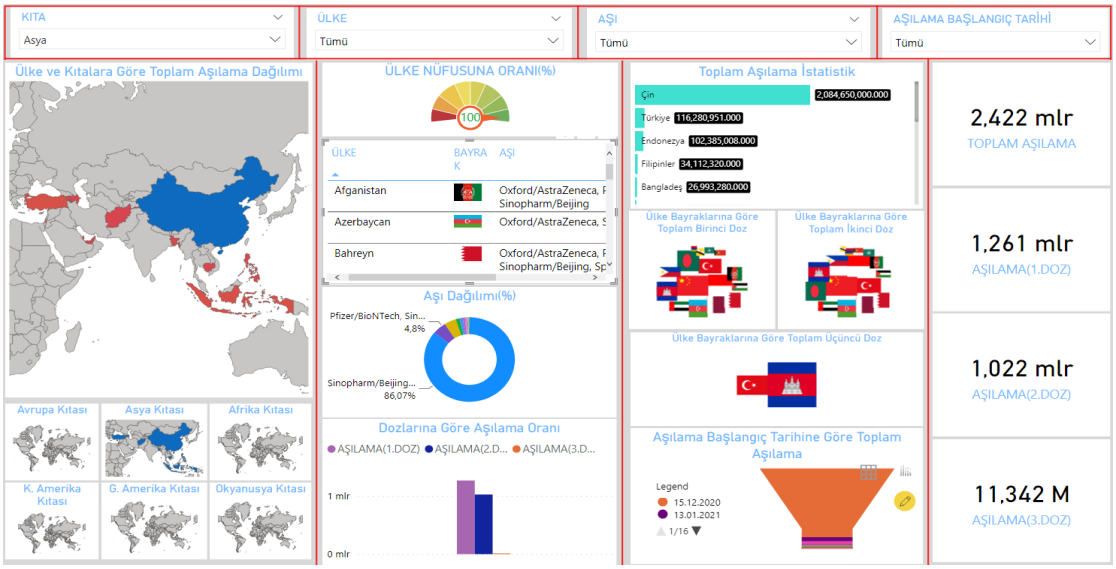


Total Vaccination Module According to Vaccination Start Date

This module provides the user with the total vaccination information of the countries, in order of the date on which the most vaccinations were made, from the most to the least. The total vaccinations for the relevant continent are listed in order of the date on which the most vaccinations were applied. For example, in Figure 12, it is seen that the total vaccination in the Asian continent was done in China on 15.12.2020. It is learned that the total vaccinations for the relevant vaccine or vaccines were done in which country and on which date. It is seen that the total vaccinations for the relevant vaccine were applied in Germany on 27.12.2020.

Figure 11

Total vaccination module according to vaccination start date

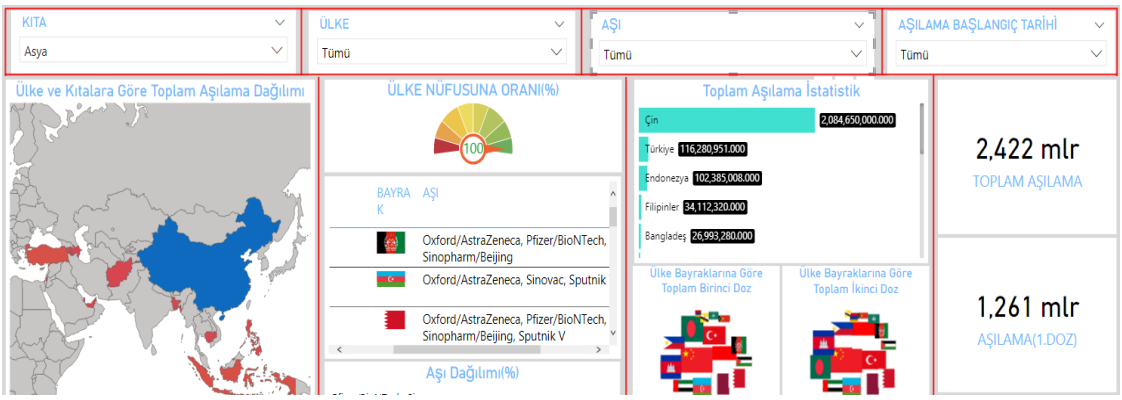


Total Vaccination Module

This module uses our country, continent vaccine, and vaccination start date selection modules, and the total number of people vaccinated in relation to this selected parameter data is transferred to the user. The relevant vaccination start date is selected. Total vaccination information is transferred to the user depending on the selected vaccination start date.

Figure 12

Total vaccination information for the selected country



Conclusion and Recommendations

In this study, the importance of dashboards in data analysis processes has been demonstrated through an application example. The fact that safe and effective COVID-19 vaccines have a great social value has increased the motivation of the study. At this point, the development and production of COVID-19 vaccines specified in the Health Policy document, their affordability, allocation, and distribution, as well as the effects of vaccine inequality and the absence of vaccine inequality were analyzed using the Power BI analysis application.

The dashboards used revealed that vaccine inequality, although complex, is still a solvable problem. However, the defining characteristics of vaccine diplomacy and its potential effects on COVID-19 immunization were examined in the light of vaccine empathy. The results underlined the instrumental and indispensable role of vaccine diplomacy in solving the problem of vaccine inequality in the midst of the pandemic. Finally, with the application example, it was proven that dashboards can be used effectively and efficiently in the analysis process of a health problem, thus clearly demonstrating the importance of dashboards.

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